CLAIMS

Sub B'

1. Radiofrequency transmitter, of the type supplied with two signals in baseband and in quadrature, i(nT) and q(nT), which are images from two binary streams representing information to be transmitted, the radiofrequency transmitter characterized in that it comprises:

- means (1) of transposition into an intermediate frequency and of digital processing, that provide a first transposition into the digital domain, at an intermediate frequency ω_0, for said base band signals, and generating, by combination, two signals at the intermediate frequency and in quadrature;

- means (2) of direct conversion, providing a second transposition into the analog domain, after multiplication by a frequency ω_1, followed by a summation, of said two signals at the intermediate frequency and in quadrature, in a way that generates a resultant signal which is finally modulated around a frequency ω_2, where $\omega_2 = \omega_0 + \omega_1$.

2. Radiofrequency transmitter according to Claim 1, characterized in that said two signals at the intermediate frequency and in quadrature are of the form:

* $m_1(t)=i(t).\cos(\omega_0 t)-q(t).\sin(\omega_0 t)$

* $m_2(t)=-i(t).\sin(\omega_0 t)-q(t).\cos(\omega_0 t)$

and in that said resultant signal is of the form

* $m(t)=g_1.m_1(t).\cos(\omega_1 t+\theta_1)+g_2.m_2(t).\sin(\omega_1 t+\theta_2)$

where

- g_1 and g_2 are the respective gains for the two channels in quadrature of said means of direct conversion

- θ_1 and θ_2 are the respective phase shifts for the two channels in quadrature of said means of direct conversion.

3. Radiofrequency transmitter according to ~~any one of Claims 1 and 2~~ Claim 1 characterized in that it is produced in the form of an integrated circuit.

4. Radiofrequency transmitter according to ~~any one of Claims 1 to 3~~ Claim 1 characterized in that it additionally comprises filtering means (17) that receive and filter said resultant signal, in a way that suppresses, at least in part, a parasitic component of said resultant signal, at the image frequency ω_{-2} of said frequency ω_2.

5. Radiofrequency transmitter according to ~~Claims 3 and 4~~ Claim 3, characterized in that, at least a part of said filtering means (17) is included in said integrated circuit.

6. Radiofrequency transmitter according to ~~any one of Claims 1 to 5~~, characterized in that it additionally comprises means (10, 11) of digitally compensating for imperfections in gain and in phase of said means of direct conversion.

7. Radiofrequency transmitter according to Claim 6, characterized in that, said means of digital compensation comprise:

- means (10) of estimating the imperfections in gain Δg and in phase $\Delta\theta$ of said means of direct conversion with,
  * $\Delta g = g_2 - g_1$
  * $\Delta\theta = \theta_2 - \theta_1$
- means (11) of applying a correction to said two signals at the intermediate frequency and in quadrature, in a way that generates two corrected signals, $m_{1c}(t)$ and $m_{2c}(t)$ at the intermediate frequency and in quadrature, the corresponding resultant corrected signal being written:

* $m_c(t) = g_1.m_{1c}(t).\cos(\omega_1 t + \theta_1) + g_2.m_{2c}(t).\sin(\omega_1 t + \theta_2)$

8. Radiofrequency transmitter according to Claim 7, characterized in that, said means (10) of estimating imperfections comprise:

- transposition means (12), that provide a third transposition in the analog domain, by multiplication of the resultant signal by said transmission frequency ω_1, in a way that generates the following intermediate signal :

* $m'_3(t) = g_3.m(t).\cos(\omega_1 t + \theta_1)$,

where g_3 is the gain introduced by said transposition means (12), said filtering means (13) and said analog/digital A/N conversion means (14).

- high stop filtering means (13), providing filtration of the intermediate signal and generating an intermediate filtered signal $m'(t)$;

- analog/digital conversion means (14), enabling one to convert the intermediate filtered signal $m'(t)$ into digital;

- means (15) of calculating imperfections in gain Δg and in phase $\Delta\theta$ from the digital filtered intermediate signal by said means of analog/digital conversion.

9. Radiofrequency transmitter according to Claim 8, characterized in that, said means (15) of calculating imperfections in gain Δg and in phase $\Delta\theta$ comprise:

- means of transforming said digital filtered intermediate signal in the form:

* $m'(t) = I'(t).\cos(\omega_0 t) - q'(t).\sin(\omega_0 t)$

and in that the imperfections in gain Δg and in phase $\Delta\theta$ are estimated in accordance with the following formulae;

* $\Delta g = 2g - (4/g_3).[i'(t)+q'(t)].[i(t)-q(t)]$

* $\Delta\theta = (1/g.g_3).[i(t).q'(t)-q(t).i'(t)]$.

10. Radiofrequency transmitter according to ~~any one of Claims 8 and 9~~ Claim 8, characterized in that said gains g and g_3 have values of power 2.

11. Radiofrequency transmitter according to ~~any one of Claims 7 to 10~~ Claim 7, characterized in that said two corrected signals, at the intermediate frequency and in

quadrature, are written in the following simplified form:

* $m_{1c}(t)=(1+(\Delta g/2g)).[i(t).\cos(\omega_0 t-(\Delta\theta/2))-q(t).\sin(\omega_0 t-(\Delta\theta/2))]$

* $m_{2c}(t)=-(1-(\Delta g/2g)).[i(t).\sin(\omega_0 t+(\Delta\theta/2))-q(t).\cos(\omega_0 t+(\Delta\theta/2))]$

12. Radiofrequency transmitter according to ~~any one of Claims 6 to 11~~ Claim 6, characterized in that said means (14) of analog/digital conversion have a working frequency substantially identical to the working frequency of means (5_1, 5_2) of digital/analog conversion included in said means (2) of direct conversion.

13. Radiofrequency transmitter according to Claim 3 ~~and any one of Claims 6 to 12~~, characterized in that said means (10, 11) of digital compensation are included in said integrated circuit.